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SOCIETY PROCEEDINGS

THE HELMINTHOLOGICAL SOCIETY OF WASHINGTON

The fifty-fourth meeting was held at George Washington University, on Oct. 21, 1921.

Dr. Hall presented a paper on "Sterile Tapeworms in Unusual Hosts."

Two entire specimens of tapeworm and one fragment collected from the goat at Antigua, British Indies, were sent to the federal Bureau of Animal Industry by Dr. H. Goodwin in May, 1920. These worms were evidently anoplocephaline tapeworms, but it was impossible to determine the genus as the genitalia were inadequately developed even in specimens showing the narrowing of the segments which precedes the separation of gravid segments. The complete worms were 3.5 and 7.5 cm. long and the fragment 10 cm. long. Rudimentary genital canals and ovaries were present in many segments, but the relation of the genital tubes to the excretory canals could not be determined. The fact that these tapeworms were sterile and possessed only rudimentary genitalia suggests that the host is an unusual one, and it is of some interest to correlate this finding with other findings along this line.

Dr. Goodwin sent also a tapeworm collected from a pig at Antigua. This worm is also an anoplocephaline tapeworm, but the genitalia are so rudimentary that identification is impossible. Apparently the sterility is associated with development in an unusual host, since no intestinal tapeworms are normally present in swine. Kholodkowsky has reported *Thysanosoma giardi* from swine, Stiles has reported three cases of tapeworms from this host and Oettle one. As Stiles has noted, records of this sort appear on first sight to be open to suspicion since swine may have eaten these tapeworms a short time before being killed and examined, but evidently swine may occasionally serve as hosts in cases of accidental infestation. Where the worms are sterile, this fact favors the idea that they developed in this host, the incompleteness of development being associated with the unsuitable environment of the unusual host. Douthitt has described *Andrya translucida* from *Geomys bursarius* and notes that in his material most of the terminal segments were devoid of eggs. He concludes that the tapeworm was not found in its usual host and that the comparative sterility is due to the unusual environment. A large amount of evidence indicates the occurrence of nematodes of various sorts in unusual hosts, with a concomitant sterility or imperfect development.

Mr. Augustine presented a note by Cort and Augustine on apparatus used in making a soil survey in the island of Trinidad during their study of the distribution of human hookworm larvae.

Dr. Cort presented a note by Cort and Augustine on *Observations on hookworm larvae in the soil.*

(See a series of papers on Investigations on the Control of Hookworm Disease, Amer. Jour. Hyg., v. 1, 2; 1921, 1922.)

Dr. Hall noted that the wash of rain on hill pastures apparently resulted in keeping them more or less cleaned of worm infestation, at the same time increasing the infestation in the valley pastures, and that shepherds for centuries had noted that hill pastures were especially well adapted to sheep, since they appeared to be more healthy and thrifty on such pastures. Dr. Darling spoke in confirmation of the same idea, noting that in the case of the human hookworm it had been observed that there was less infestation among persons living on a hillside than among those living in the valley.

Dr. Curtice noted that in a study of sheep parasites he had found that even where there was abundant vegetation in the valleys the sheep preferred to graze on the higher hillsides, cropping them close and leaving the lower vegetation uncropped. He noted that at certain intervals after a rain the count of worm eggs present in the manure increased. It had been found that the control of these parasites by routine anthelmintic treatment once a month was superior to pasture rotation accompanied by desultory treatment. The results of worm control were manifest in increased gain in weight and wool production. He is now testing treatment at intervals of 3 weeks and believes that persistent treatment in man promises to be one of the best control measures.

Dr. Cort noted that 5 percent formaldehyde killed free-living nemas found in soil, but did not kill hookworm larvae; Baermann was confused in regard to larvae found without sheaths. Dr. Ransom stated that putrefactive bacteria were among the most important enemies of hookworm larvae. Dr. Cort noted that some free-living nemas were also detrimental to the larvae. He added that the use of ashes in cultures aided in keeping down putrefactive bacteria. Dr. Bartsch noted that one is advised to wear gloves in working in soil in the tropics, but in his experience in collecting molluscs gloves are annoying and are usually soon discarded. He had never become infected under these conditions, a fact which bore out Dr. Cort's conclusions in regard to the limitation of soil infestation.

Dr. Ransom noted in connection with the longevity of larvae in the tropics, that tick larvae live longer at lower temperatures than under higher, within certain limiting ranges. Dr. Shillinger asked in regard to tests of soil acidity in connection with infestation with hookworm larvae. Dr. Cort reported that this was not tested, though work along this line was planned. Dr. Hall called attention to the test reagents for this purpose devised by Wherry. In this connection, Dr. Cort reported that in one area with a high degree of soil pollution, where there was considerable shade and much humus, the soil infestation was very light.

Dr. Cort noted that hookworm larvae must die rapidly during the dry season and suggested that this might prove to be the best time to push hookworm treatments, thus cutting off soil infestation at its source. It would appear that a second treatment should follow the first after an interval of 6 weeks and a third treatment after an interval of 3 weeks, the first interval being correlated with the 6-weeks' duration of the life of larvae in soil as observed in Trinidad. Dr. Curtice reported that in the experiments on sheep parasites carried on at Vienna, Virginia, by the Bureau of Animal Industry, no hookworms had been found in the sheep for four or five years, due, apparently, to the control measures employed.

Dr. Cobb presented the following notes:

How Certain Apogeotropic Nemas Climb on a Dry Surface

Certain nemas parasitic on and in some of the dung beetles (*Aphodius fimetarius,* etc.) are able to crawl on dry surfaces by virtue of an oily secretion poured out through the mouth. These nemas do not wet with water. They lie on its surface and tend to float together in adherent groups, apparently by virtue of an external coating. On treatment with osmic acid these nemas darken, indicating the existence in them of such substances as fatty and oily compounds which react in this manner. Mounted alive in water, under slight pressure these nemas extrude and withdraw at the mouth opening a non-miscible substance having a refractive index different from that of water. A chemically clean cover glass over which these nemas are allowed to crawl will display traces of this substance by showing the darkening reaction with osmic acid, the darkened substance not being soluble in water. This evidence makes it extremely probable that these nemas utilize this secretion in climbing dry surfaces. Whenever these nemas are placed in a drop of water on a dry slanting or perpendicular surface, they promptly leave the water and begin to crawl upward on the dry surface, whether in the light or in the dark.

Howardula benigna; *a Nematode Parasite of the Cucumber Beetle* (*Diabrotica*)

The occurrence of this nema has already been reported. The beetles it infests do great damage, occurring over the entire country. The nema is found on an average in 20 percent of these beetles. In the vicinity of Washington it was found this year in about 50 percent. There are no males, this being a syngonic form. The larvae leave the beetles with the eggs, from 6 to 50 larvae to each egg. As the grub hatches, the nemas bore into it. This nema appears to be a control factor of great economic importance and is one that is already available. Supplies of the nema are already being sent out to infested districts as an aid in control.

Dr. Cobb also reported a larval nema from the dung beetle, *Aphodius fimetarius,* and stated that he had found amphids in this worm. Dr. Ransom identified the worm as a larva of Gongylonema. This is the first time that amphids have been reported definitely under that name from parasitic nemas. They appear to be the organs commonly called the lateral papillae in parasitic forms. In comment on the secretion poured out by nemas in climbing over a dry surface, Dr. Hall noted Schewiakoff's theory of gregarine movement, to the effect that the translatory movement was due to an extruded gelatinous thread which flowed posteriorly and hardened, thereby pushing the gregarine ahead, and to Crawley's comments on this theory.

The fifty-fifth meeting was held at the School of Hygiene and Public Health of Johns Hopkins University on November 19, 1921.

Dr. Bartsch presented a note in regard to the mollusc genus Blanfordia. Robson has recently shifted the genus Nosophora to Hypsobia, but as Hypsobia is antedated by Blanfordia, the latter must stand as the correct name of the genus. Dr. Cort commented on the importance of this snail as a host of *Schistosoma japonicum* and stated that he had submitted specimens of the mollusc, furnished him by Dr. Katsurada, to Robson for determination.

Dr. Simon presented a note on the occurrence of *Loxogenes arcanum* in *Rana clamitans* in Nova Scotia. A frog had been found anemic on examination and on further study tumors were found near the pylorus. From these tumors flukes belonging to the species named could be squeezed out. The tumors were common in frogs in Nova Scotia. The fluke was discovered in the liver of frogs in Ontario by Stafford in 1900. The same year Nickerson found it in cysts near the pylorus in frogs in Massachusetts. In 1911 Osborn reported it from St. Paul, Minnesota, the worms occurring near the pylorus and the neck of the bladder. Dr. Simon exhibited specimens of the worms and the tumors caused by them, noting that the worms caused a proliferation of the glandular epithelium, the hyperplastic tissue growing through the muscular coats of the stomach. The growth is not necesarily malignant, but is similar to the hyperplasia in bilharziasis, which sometimes becomes malignant. Fluke eggs are found in the cyst cavity and its walls. The lesions show a high local eosinophilia.

In comment Dr. Hall noted that there was apparently some possibility that a solution of the cancer problem might be reached through the field of parasitology, as the dependable production of cancer following infection of rats and mice with *Gongylonema neoplasticum* furnished very valuable material for an experimental study of this disease. It has also been reported recently that malignant tumors can be experimentally developed in 50 percent of experiment mice by infecting them with *Cysticercus fasciolaris,* though later investigations have not confirmed this report. The association of various parasites with the occurrence of neoplasms was also noted in schistosomiasis, mite infestations, etc. Dr. Ransom noted that de Jong found neoplastic growths caused by parasites retrograde with the death of the parasites and no malignant growths develop, but that under certain conditions the persistence of the parasite may lead to the development of serious but non-cancerous growths. Dr. Simon reported that the flukes in frogs may at times occur in the mesentery and Dr. Cort reported finding them in the region of the rectum and bladder.

Dr. Taliaferro presented a note by Taliaferro and Becker on the structure of the iodine cysts. These were first reported from human feces and were subsequently found to be widely distributed. They have been reported twice from pigs, the cysts in these cases showing no recognizable differences from those in human cases. At present the consensus of opinion is that they are encysted amebae. They are small, round forms 7 to 12μ in diameter, with a glycogen center taking the iodine color. Kofoid has regarded them as forms of

Endolimax nana and certain staining reactions suggest this relationship. However, a critical examination of these forms does not bear out this conclusion and it appears that the iodine cysts are not Endolimax. The cysts of *Amoeba fragilis* have not yet been found ,and a case of infection with this protozoan in Baltimore is reported by the authors.

Dr. Cort presented a note on sources of soil infestation with hookworm larvae. (See Investigations on Control of Hookworm Disease, etc.)

Dr. Hall presented the following note by Dr. Cobb:

Notes on the Adhesion-Tubes of Draconema cephalatum

The following observations were made on specimens of *Draconema cephalatum* from Hudson's Bay, collected by Mr. Fritz Johansen and forming a part of the Canadian Arctic Expedition material. The specimens were fixed with alcohol-formalin and stained with acid carmine.

The adhesion tubes, each connecting at its base with a duct leading to a distinct gland, are arranged in a long ventral group opposite to and a little in front of the major sole. The anterior pair of glands, which is sometimes slightly separated from the general mass of the glands, is composed of two glands having three nuclei each. The cells of each gland, as well as their nuclei, diminish in size from back to front, the anterior cell having less than one-eighth the volume of the posterior. Posteriorly, each gland diminishes suddenly in diameter to form a duct, which leads backward and outward to the seta and which is from one and one-half to two times as long as the gland. Where the duct enters the somewhat swollen base of the adhesion tube, there is a small duplex enlargement or ampulla. These glands are so closely packed together that it is difficult to distinguish the exact number of groups, but it is evident that throughout the series, the glands are arranged in groups side by side, apparently mostly in pairs or quartets.

Dr. Hall presented a note by Hall and J. E. Shillinger, entitled "Miscellaneous Tests of Carbon Tetrachloride as an Anthelmintic." The paper reviewed the published literature dealing with tests on dogs, horses, and monkeys, and the one report of the results of administering an experimental dose of the drug to man. Additional tests on dogs, foxes, swine and sheep were reported. The drug seems to be specifically valuable for the removal of the blood-sucking strongyles, removing 100 percent of the worms present in the case of the hookworms of dogs and, apparently, of foxes, of stomach worms and hookworms of sheep, and of Strongylus of horses. It was surprisingly effective in removing the small trichostrongyles of sheep, removing 82 percent of 800 worms present in 3 sheep. It is quite effective against ascarids in dogs, swine and horses, though rather large doses are required in the case of swine. When used in large doses it is rather effective against whipworms. So far the drug has been found to have an unusually high safety factor. Dogs show no bad effects after doses of 5 c.c. per kilo of live weight, and as the therapeutic dose is 0.3 c.c. per kilo, the safety factor appears to be at least 17 and is probably higher. Foxes have survived doses of 2.7 c.c. per kilo, though these animals are extremely susceptible to poisoning by anthelmintics. Monkeys survived doses of 6 c.c. per kilo. On the basis of the experimental findings on animals the drug is now being tested on man by physicians as a treatment for hookworm infestation.

The paper was discussed by Drs. Simon, Shields, Cort and Curtice.

The fifty-sixth meeting was held December 10, 1921.

Dr. Hadwen spoke on parasites he found in reindeer and other animals in northern Alaska during 1920-1921. Some herds were very lightly infested. Among the parasites found were screw worms (Phormia sp.), warbles (*Oedemagena tarandi),* grubs in the head *(Cephenomyia nasalis)* and various species of Sarcosporidia. One species of Sarcosporidia was found in the heart and another in brownish cysts in the legs. A third species is apparently a *Balbiania* or a closely related form. A sarcosporidian with very large cysts up to 2.2 cm. long was found in seals. It was observed that reindeer harbor the largest number of warbles during the first year of life; approximately half as many were present during the second year, and very few thereafter. The injection and instillation of juices from larvae of Cephenomyia and Oedemagena produced little evidence of anaphylaxis. If these forms produced serious anaphylaxis it would be a matter of great importance, as some animals harbor as many as 1,000 warbles. Actually the anaphylaxis is much less marked than that produced by Hypoderma. The adult Oedemagena causes the reindeer to "mill," or travel in a circle, but does not cause as much fright as Hypoderma. On the other hand, Cephenomyia does frighten reindeer. Upon the approach of one of these flies, as it poises in front of the animal's nostrils, the animal stands as if petrified, with lowered head, staring eyes and outspread legs. The reindeer starts violently when struck by the fly. Later there is some nasal irritation with discharges from the nostrils. This parasite is difficult to control. The control of Oedemagena is also a difficult problem. Moving the herds after the larvae have left the reindeer is a useful control measure, and building sheds for shelter may be of value.

Cysticercus krabbei was not found to be as commonly present, or as numerous as was expected. *Cyst. tenuicollis* was common and hydatids were occasionally found in the lungs, never in the liver. Species of Moniezia were very common, especially in fawns, and the observations made indicate that these worms grow very rapidly. Species of Nematodirus are apparently very common and serious parasites, and in one case were found associated with a marked anemia. Two species of this genus, as yet undescribed, occur in Alaskan reindeer. A species of Dictyocaulus, a large form, is common in the bronchi.

The paper was discussed by Dr. Stiles and Dr. Bartsch, the latter raising the question as to the origin of the existing parasites of Alaskan reindeer. Dr. Hadwen thought that they were imported with the reindeer. A herd on one of the islands of Alaska was found practically free from parasites, probably as a result of the reindeer originally brought to this island having been without parasites or only slightly infested. He noted that in one case fawns had been put on an island 14 miles from the coast after all visible grubs of Oedemagena had been removed, but as many eggs were found on these animals the next fall it is probable that a sufficient number of grubs escaped to keep up the infestation. The fly is very resistant, apparently, to water and frost. The eggs of this fly are mostly laid on the line of contact of the animal with the soil, especially about the hocks and knees. The flies back up to oviposit and may lay as many as 25 eggs on one hair. The eggs hatch spontaneously without extraneous stimulation. Dr. Hadwen stated that caribou skins free from warble holes were a great rarity.

Dr. Curtice noted that Nematodirus in sheep is a serious pest, causing distinct injury and evident losses when present in large numbers where there were very few stomach worms present. Dr. Ransom stated that the species of Nematodirus found in reindeer are large, one of them being very large.

Dr. Hall noted that *Oestrus ovis* of sheep appear to be controlled in a rather satisfactory manner by the use of pine tar smeared on the nose. Dr. Hadwen stated that no control measure of this sort had been attempted in the case of Cephenomyia; the grub was often covered with blood when sneezed out.

Dr. Bartsch discussed the native fauna of Alaska, noting the various theories as to its origin. In some areas there was no glaciation during the Glacial Epoch, the fauna persisting at a time when the fauna south of these areas was wiped out or driven back. After the retreat of the ice sheet the Southern fauna worked north to meet the surviving Northern fauna.

Dr. Hall presented the following note:

A Case of Apparently Spurious Parasitism in Man

Under date of July 29, 1921, Dr. St. J. B. Graham of Atlanta, Georgia, sent some specimens to Dr. L. O. Howard, U. S. Bureau of Entomology, with the following letter: "I send you today two or three larvae passed about two years ago by a mountaineer from the bladder with the urine. He passed many of these and they flipped about on the ground when he made or passed urine in the open. A physician brought out some with a catheter; passed them while snow was on the ground, winter and summer. . . . They do not answer to ordinary larvae of urinary miasis, *Fannia scalaris* or *Fannia canicularis*. All my dealings with this case were by mail. . . . The patient was extremely nervous, but has ceased to pass larvae some months ago." The specimens in question are small oligochaetes, evidently free-living forms which can scarcely be regarded as parasitic. It is hardly conceivable that they could occur in the urinary bladder of man unless they were introduced there. It would appear that the patient's mentality and habits should be investigated. As the patient was said to be extremely nervous, it is probable that some mental derangement is associated with this case.

In comment Dr. Ransom noted that similar cases often come to the attention of the government laboratories and that they are almost always poorly defined and involve probable errors of observation or of interpretation. Dr. Stiles exhibited a specimen of *Paragordius varius* from Indianapolis, Indiana, with the history of having been passed from the urinary bladder of man.

Dr. Stiles also presented a note on the nomenclature of Amoeba. The original name used for animals belonging in what might be regarded as amebae, was Chaos. Chaos appears to be undefinable and it seems advisable to suppress it. The nomenclature of the pathogenic and non-pathogenic amebae of man is very difficult and unsatisfactory and very much complicated. However, a fair case may be made out for retaining *Endamoeba coli* as the name of the non-pathogenic form and *Endamoeba histolytica* as the name of the pathogenic form. At present it appears probable that too many genera are being made in this group. It would seem advisable to retain Endamoeba for the foregoing parasitic forms and to put other forms in subgenera until they are established on a sounder basis.

Dr. Ransom presented a note illustrated with lantern slides, dealing largely with plans for making the results of investigations of economic importance available for practical use in the control and eradication of parasites, with reference particularly to ascaris in swine. The paper was discussed by Dr. Stiles and Dr. Curtice, who pointed out the need for greater practical utilization of our present knowledge.

The fifty-seventh meeting was held on January 21, 1922. Attention was called to the fact that the Royal College of Veterinary Surgeons of England had awarded the Steel Memorial Medal to Dr. Albert Hassall.

The following American corresponding members were elected: Ackert, Barber, Boeck, A. C. Chandler, van Cleave, Graybill, May, Riley, Schwartz, Scott, Stunkard, Wigdor and Wolbach.

Dr. Stiles reported that the International Committee on Zoological Nomenclature had accepted for the official List of Generic Names the names proposed by the society, and he raised the question as to the advisability of submitting additional names. A committee was appointed to draw up such a list of names and report. Dr. Stiles suggested that there should be a Code of Ethics for zoologists, and he called attention to the harsh and caustic criticisms sometimes made in publications in regard to other zoologists.

Dr. Stiles discussed the possibility that the recent war had resulted in a spread of amebiasis in the United States, presenting in this connection some statistical findings by Dr. Boeck. Kofoid has found amebiasis in over 12 percent of 2,300 returned soldiers in a New York debarkation hospital, and in 67 percent of veterans who are students at the University of California. According to Kofoid a single stool may contain 50,000,000 cysts; he estimates that 3,000,000 overseas soldiers have been exposed and that probably over 300,000 are carrying amebiasis back into this country. On these grounds he urges that the United States examine and treat returned soldiers.

According to Dr. Stiles, it costs about $1.20 to make a fecal examination for parasites, or $0.60 to examine for amebae alone. The costs for microscopic examination, collection and hospital expenses would total about $32,400,000.

Before incurring any such expense, one must be very certain of its necessity. To secure information on the prevalence of amebiasis in this country, circulars were sent to 607 hospitals and 115 medical schools in regard to clinical cases of amebiasis found by them. In the 532 replies from 44 states, 24, or 4.4 percent, were affirmative for cases seen. These affirmative were indefinite and usually referred to one or a few cases. The Hygienic Laboratory examined 13,047 samples from 8,029 persons, chiefly in government hospitals. *Endamoeba histolytica* was found in 4.1 percent, most cases being carriers without clinical symptoms. Doubtless more would have been found infected if 6 examinations per capita had been made. Groups examined included in addition to the government hospital group, Ellis Island immigrants, persons at the Reform School and the Industrial School at Washington, D. C., persons in the military service at home and abroad, and various civilians. The Industrial School had amebiasis in 12 percent of the persons examined, though no clinical cases have ever been observed at the school. In undertaking a large project, such as the treatment of the returned soldiers, one must take into consideration principle, policy and price. The studies of amebiasis in the groups examined in this country show that the returned soldier is not a menace and that the war has not materially changed the situation in the United States as regards the prevalence of amebiasis. Furthermore, there is no law under which the returned soldiers could be ordered examined, any more than soldiers not going abroad or civilians could be made to submit to examination. So far as the urban population is concerned, there is little likelihood of the cysts of *E. histolytica* which are carried away in sewage being returned to man as infective agents. Where privies are used, there is some danger that part of the cysts would be carried back to man by insects, though most of the cysts die. Where there is no sanitation the danger is greater. It appears then that clinical control is not advisable, but that sanitary control is the important thing. If the federal government is to spend $30,000,000 on control, it should be spent on sanitation; a smaller amount spent in this way would do more good than a larger amount spent on clinical control. A patient with clinical symptoms will take medicine; as a rule a carrier will not. So far as determined, from 5 to 7 percent are carriers of amebae, and this itself is reason for sanitation, but not for clinical treatment. The war has shown that we have exaggerated the importance of protozoan infections of the intestine. The claim has been made that fecal examinations for protozoan parasites should be made in every hospital for every patient. This would cost at least $0.50 and a private laboratory would charge $5.00 or more. Stiles has recommended that such examinations be made as routine for all patients in or from the South, and otherwise only in cases showing anemia, intestinal disturbances or amenorrhea of unexplained origin. For other cases it is not practical and is too costly.

Dr. Stiles noted that amebae have been regarded as water-borne but in his opinion foodhandlers and the common house-fly are largely responsible for the distribution of the cysts. Among the patients examined at St. Elizabeth's Hospital for the Insane at Washington, D. C., it was found that protozoan parasitism tends to increase with length of residence, as has been found to be the case elsewhere. It appears not unlikely that carriers of amebae employed as cooks, waiters, etc., are responsible for this. At one college, 67 percent of certain men examined (Kofoid) were found to be infected; all of these men served in the same unit in France. A reasonable explanation is that some carrier might be responsible for this infection.

Dr. Butler noted that in 1912 a high percentage of men from one ship at Manila were found infected with amebae, presumably as a result of the concentration of persons in narrow limits in the presence of a carrier. Dr. Stiles stated that extensive studies of amebiasis had been made also in India and in England. He also stated that *Councilmania lafleuri* had not been recognized in the present survey, and if it was present and seen it would have been regarded as *E. coli* and included in the figures for that species. Dr. Butler noted that the Navy might bring in many parasites, as ships touch at foreign ports, infected persons without clinical symptoms serving as carriers.

Dr. Ransom presented the following note:

Observations on the Toxic Effects of Ascaris Fluids

Repeated cutaneous tests on a human subject (B.H.R.) with fresh fluid from the body cavity of the swine ascarids (pulverized after thorough drying) gave definite and prompt local reactions, a stinging sensation, itching, formation of a wheal, and reddening of the surrounding skin, with swelling. These tests were made by applying a drop of the fluid or particles of the powder to a scratch made in the skin through the epidermis without drawing blood but exposing the cutis. The tests were made at varying intervals during a period of several months between December, 1917, and May, 1918. The first test was made 3 days after a conjunctival reaction (itching, reddening and swelling) of which the accidental introduction of Ascaris fluid into the eye was suspected of being the cause, a suspicion confirmed by the prompt appearance of a local reaction following a cutaneous test. A second test later in the same day was also followed by a pronounced local reaction. A third test made with powdered Ascaris 5 days after the second test gave a pronounced local reaction and 10 hours after the first appearance of the reaction which came on within 5 minutes, the skin at the site of the reaction was still reddened and tensely swollen over an area 3 cm. in diameter, with a red streak 25 cm. or more long, extending up the arm from the swollen area. Another test in April, 1918, using boiled Ascaris fluid gave a similar reaction. Eighteen hours later a blood smear was made. A differential count of the leucocytes showed 26 percent of eosinophiles. A total leucocyte count was not made. Beginning 20 days later differential counts of the leucocytes (no total counts made) on several days gave percentages of eosinophiles varying from 1.4 to 3 percent, neutrophiles varying from 53 to 65 percent, and mononuclears (large, small, and transitional) varying from 33 to 44 percent. On May 3 and May 6 tests were made with dried Ascaris powder, giving positive but slight reactions. There were no marked changes in the differential count of the leucocytes following these tests (total counts not made). On May 7 at 11 o'clock, a drop of fresh Ascaris fluid accidentally fell on a very small, slight, recent abrasion of the skin of the wrist; this was followed in less than 5 minutes by the usual appearance of a pronounced local reaction, and these very soon by general urticaria, which at 11:15 was well established over the entire body. The face and eyes were swollen. The heart was very rapid, beating at the rate of at least 150 per minute. There was a sensation of warmth and breathlessness. At 11:30 the symptoms were beginning to subside, the heart was slower. An hour after the beginning of the reaction the urticarial wheals were still present; after another half hour the wheals had become red, the face and eyes were less swollen. At 1 o'clock the arms and body were spotted with red, the eyes only slightly swollen. On the arm surrounding the abrasion the skin was reddened and swollen over an area several inches broad, with a red streak extending up to the shoulder from this area. At 4 o'clock, 5 hours after the beginning of the reaction, the red spots on the body had become very faint, the face and eyes were slightly swollen, the arm in the region of the abrasion much swollen, but only faintly red. The next day the affected region of the arm was still somewhat swollen, the face slightly swollen. On May 9, two days after the occurrence of the reaction, the arm continued slightly swollen, but on May 10 the swelling had entirely disappeared. A blood smear was made two and a half hours after the beginning of the reaction. A differential count of the leucocytes (no total count made) showed 82.5 percent neutrophiles, 17 percent mononuclears, and 0.5 percent eosinophiles. Five and a half hours after the beginning of the reaction the neutrophiles were 79.5 percent, mononuclears 20 percent and eosinophiles 0.5 percent (differential count only). In the afternoon of the following day a differential count gave neutrophiles 60 percent, mononuclears 36 percent and eosinophiles 3.5 percent.

These observations confirm observations made by Bastian, Leuckart, Railliet, Linstow, Goldschmidt and others as to the more or less severe effects of the secretions or body fluids of ascarids upon susceptible individuals, and show also that the absorption of minute quantities of the offending substance may not only cause alarming and distressing symptoms, but also greatly disturb the equilibirum of the blood, as evidenced by the changes seen in the relative percentages of the different varieties of leucocytes. The absence of total leucocyte counts in the present instance, as well as the fact that the various changes in the blood that have been observed by different investigators following the injection of verminous toxins and a variety of foreign proteins into experimental animals have not been well correlated, does not permit broad conclusions to be drawn as to the significance of the results of blood counts in this case. The experiences with Ascaris fluid indicate a possible risk in cutaneous tests of susceptibility to foreign proteins, now very commonly made on patients suspected of foreign proteid sensitization. It was also suggested, as may already have been suggested by others, that some of the recorded cases of sudden death in which wandering ascarids have been found in the larynx or trachea may have been caused by edema accompanying a local reaction of the mucous membrane of the larynx to contact with the worms.

In comment on the cases where eosinophiles are rare in the circulation, Dr. Hadwen noted Weinberg and Seguin's findings to the effect that eosinophiles left the circulating blood to mass at the point of injection of parasite fluid. Dr. Butler noted that eosinophilia is commonly present in cases of urticaria, a matter of interest in connection with Dr. Ransom's case where a marked urticarial reaction was accompanied by a low eosinophile count. Dr. Ransom called attention to Hadwen's experiments where Hypoderma juices contaminated with bacteria were used; the eosinophiles engulfed the bacteria which had been opsonized with Hypoderma fluids. Dr. Stiles reported that at one time Railliet had suffered from the effects of ascaris toxins and had discontinued wearing the laboratory attire worn during the work on ascarids: Some time afterward this laboratory suit was put on and promptly brought on a recurrence of the original symptoms.

In reply to the question as to whether ascarid infestation was involved in the reaction to ascarid products, Dr. Ransom noted that sheep, not usually infested with ascarids, can be easily killed with small amounts of ascarid fluid injected subcutaneously, whereas guinea-pigs will tolerate large amounts, even when injected intraperitoneally. Dr. Joseph Leidy, Jr., told Dr. Ransom that the removal of ascarids from a child has been followed by the subsidence of a conjunctivitis. Dr. Butler stated that asthma in Guam may be associated with ascariasis. Both conditions are very common and the asthma is often fatal, especially in children. Dr. Cort reported that many cases of asthma in Trinidad recover after successful treatment for hookworm disease. Dr. Ransom noted in this connection that extracts of hookworms or of *Haemonchus contortus* would kill sheep.

On the question as to why worms in the intestine are less injurious than their products when injected, Dr. Ransom offering the explanation that the intestine is probably a more resistant tissue for the particular attack it sustains. Dr. Hadwen noted that animals commonly lick the site of injection when parasitic material is injected. Dr. Ransom stated that hemolysis by worm products can be demonstrated *in vitro*. When asked if entire ascarids would produce anaphylaxis, as these worms were commonly used as laboratory material, Dr. Ransom stated that the entire worms could give rise to toxic effects and that susceptible students might become affected. Dr. Stiles stated that he has seen such cases in a few students, itching at the nose being a common symptom. Dr. Harper noted in this connection that certain individuals were very sensitive to horse dandruff.

Dr. Hall presented the following note:

Alaria americana *from the Cat*

A specimen of Alaria from the small intestine of the cat was sent in to the Zoological Division of the Bureau of Animal Industry by Dr. Wm. A. Riley in December, 1921. Dr. Riley states that two specimens were collected from a cat at University Farm, St. Paul, Minnesota, but one of the specimens was lost. The remaining specimen was compared with the descriptions of various known species and with the type and paratype specimens of *Alaria americana*, and appears to be an immature specimen of this species described by Hall and Wigdor in 1918 from the small intestine of the dog at Detroit, Michigan. They found this fluke in 4 of 300 dogs, 91 flukes being present in one animal. Dr. Riley's findings indicate that this fluke occurs in the cat as well as in the dog, and in Minnesota as well as in Michigan.

Oxyuris compar *Leidy, 1856, a Synonym of* Oxyuris ambigua *Rudolphi, 1819*

Leidy reported *Oxyuris compar* from the small intestine of the cat. Some later writers include it as a parasite of the dog also, but nothing in the literature warrants this inclusion. The fact that this worm, of which only the female is known, was found in the small intestine, whereas worms of this genus are usually parasites of the large intestine when adult, suggests that it was out of place and in a strange host. This is further indicated by the fact that the worm has only been found once. It seems probable that the cat had eaten some mammalian host normally parasitized by this worm and was examined postmortem while the worms of the ingested host were still present. The description of *O. compar* corresponds rather closely with that of *O. ambigua* of the rabbit, and rabbits are not infrequently eaten by cats. The measurements and proportions correspond very well. Leidy states that the tail of *O. compar* is spirally contorted. This description might well be applied on casual examination of a worm, perhaps distorted or partially digested, with the annulate tail structure of *O. ambigua*. Probably *O. compar* is not a normal parasite of cats, but a rabbit parasite found in a cat which had eaten the intestine of a rabbit.

The fifty-eighth meeting was held on February 18, 1922. The following foreign corresponding members were elected: Bayliss, Ciurea, Fibiger, Joyeux, Katsurada, Seurat and Travassos. The proposition that the society consider a code of ethics was discussed, and a committee to formulate a tentative code was named as follows: Drs. Cobb, Cort, Bartsch, Butler, Stiles and Hall.

Mr. Chapin presented the following *Note on Monostomes.*

Monostomes are not uncommonly found in the body cavity and suborbital cavities of shore birds, such as species of *Totanus, Fulica*, etc. These flukes have been very generally referred to the species *Cyclocoelum mutabile*. Kossack, however, recognizes 7 species. An examination of specimens in the Bureau of Animal Industry collection shows certain differences in the egg sizes and in other respects between specimens from *Totanus* and specimens from *Fulica*. There are two lots of specimens from *Fulica americana* available for study. In these specimens the muscular portion of the pharynx is of a diameter equal to or slightly greater than that of the posterior testis. The average length of the eggs of this species was 105.6μ. In these characters, the specimen showed a close relationship to the European *C. microstoma* Crep., from *Fulica atra*. Material from *Totanus* sp. collected in Mexico showed a much smaller pharynx and larger eggs, the average length of the latter being 135.4μ. These characters more or less parallel the characters of *C. problematicum* Stoss. from *Totanus calidus*. In comment Dr. Ransom noted it as a matter of great interest that these differences, associated with different hosts, should be duplicated in this country and in Europe.

Dr. Cobb exhibited a microscope for the rapid examination of large fields, and also a number of minature Syracuse watch glasses of various types, some of glass and some of glass and brass. The ordinary Syracuse watch glass is too large in many cases where small specimens are being handled, as it is difficult to find the specimens and the large glasses are wasteful of fluid. It is also much cheaper to grind the base of the small glasses to secure opacity.

Dr. Cobb presented a note on the coconut nema of Panama, with specimens of the nema. With other workers Dr. Cobb has recently investigated conditions in Panama where this worm constitutes a serious pest. The nema is about 1 mm. long and very slender, and belongs to Aphelenchus, a genus which includes many important pests. It infests the roots and from here enters the trunk and ascends to the crown. In about 3 weeks there is a rapid change in the tree, followed by its death. The worms are present in enormous numbers, and cause an oxidation change in the palm, the tissues turning red, whence the name of red ring applied to the disease. This red ring forms a cylinder, 1 to 1.5 inches wide under the bark, showing as a ring in cross section. The disease has spread completely around the Caribbean Sea and is probably very old; the many plantations which have been wiped out several times in this region were probably destroyed by this nema. This is a serious matter, as the cocoanut is being grown on a large scale for the last 10 or 15 years. Coconut oil is much more widely used than formerly. The disease is most fatal when the trees are 4 to 7 years old. The disease spreads very rapidly.

On looking for a carrier, it was found that a large palm weevil, common wherever coconuts are grown, feeds on the tissues and lays its eggs in the trunk. An examination showed that 50 percent of these beetles carried the nemas. Whenever a palm is cut the weevils assemble rapidly to feed, thereby gaining access to diseased tissue, which has an ethereal odor and seems to be preferred by the weevils. When the hairy mouth parts are thrust into diseased tissue, the nemas are transferred to the hairs and also get onto the hairs of the legs. They have not been found in the intestine of the beetle. The transfer of the nemas is therefore mechanical. The nemas spread best in humid environments. Old palms do not suffer, nor those on the beaches, but the younger ones farther back from the beaches. The palm can tolerate large amounts of salt without injury and thrive in its presence. The tissues of shore trees are toughened by the wind and the nema does not get as good food from them. They thrive best in the more succulent tissues of rapidly growing trees away from the beach.

The nemas were thought to be apogeotropic because they ascended objects in infested soil. But they also wander down, moving either way in the dark, but ascending in light. Apparently they are phototropic. The nemas are not found on the surfaces of the palms and do not climb the trees, but probably start as root parasites. There are numerous tough roots to a palm, but the nemas probably enter between these and ascend the trunk. Dr. Cobb stated that the worms tolerated sea water very well but not heavy brine. The use of salt in kelp at the base of the palm is of value in keeping out the nemas and the beetles. The nemas are found in the husk, which is planted with the remainder of the nut. They also occur in young trees, but the trouble begins when the trees are 4 years old. Perhaps the rapid putting out of roots earlier aids in keeping the nemas down. Dr. Schapiro also noted that some writer had reported "hookworms" from bananas.

By vote the secretary was instructed to record a vote of congratulation to Dr. Hassall on the award of the Steel Memorial Medal.

The fifty-ninth meeting was held on March 18, 1922.

Dr. Cort presented a note on *Fork-tailed Cercariae.* In 1914-1916 he reported on two such cercariae of this type being long known, but not thought of medical interest as their relationships were unknown. Miari and Suzuki and also Leiper later investigated the life history and found that these forms were the cercariae of the schistosomes. At first it was impossible to determine the species of the adult from a study of the larvae, but subsequent work has established the relations of the larvae to the corresponding adults, the excretory system and cephalic glands being structures of great diagnostic value. Indications of sexual dimorphism in the cercariae have also been found.

Dr. Cort also reported that the field work on hookworms, begun last summer in the Island of Trinidad for the International Health Board, would be continued next summer in Porto Rico, and that besides himself Dr. and Mrs. Payne, Dr. W. A. Riley and Messrs. Stoll and Augustine would be members of the party.

Dr. Stiles noted the importance of the importation of flukes by immigrants, not only as a matter of medical interest, but because of its bearing on the welfare of the livestock and fishing industries.

A paper on *The Rat Tapeworm,* Hymenolepis diminuta, *in Man,* by Drs. Wm. A. Riley and W. R. Shannon was read in abstract (see this JOURNAL, 8: 109-117, March, 1922).

Dr. Cobb exhibited some holders which he had devised for safety razor blades to make an instrument for cutting sections in laboratory work.

The sixtieth meeting took the form of a dinner on April 1, 1922, and the presentation to Dr. Albert Hassall of the Steel Memorial Medal of the Royal College of Veterinary Surgeons of England. The medal was formally presented on behalf of the college by Dr. Seymour Hadwen.

The sixty-first meeting was held on April 22, 1922. The following officers were elected for the ensuing year: Dr. Hall president, Mr. Chapin recording-secretary, Miss Cram corresponding secretary-treasurer.

A communication from Dr. Goldfarb, with reference to the cooperation of the society with Section N, the section on medical sciences, of the American Association for the Advancement of Science, was read and discussed. It was voted that the society cooperate and that Dr. Cort act as its representative. A committee consisting of Drs. Ransom, Hall and Butler was appointed to consider borderline topics for Section N and naming those to take part in the symposium.

The Code of Ethics proposed at previous meetings was brought up for consideration with suggested amendments. The code as adopted is as follows:

CODE OF ETHICS OF THE HELMINTHOLOGICAL SOCIETY OF WASHINGTON

1. Adverse discussion of the work of another scientist should be impersonal. Any disagreement with the statements of any other writer should be expressed in terms of disagreement with the statements only and should not be expressed in a manner likely to reflect upon his competence or intelligence.
2. When specimens are examined by two or more persons with a distinct understanding or a definitely implied agreement as to publication, whether jointly or independently, the terms of the understanding or agreement should be observed as rigidly as in any contract.
3. When specimens are examined by two or more persons, as when specimens are referred by collectors to systematists, all persons concerned may retain the right of independent publication in the capacity in which they act.
4. In correspondence or conference, statements of new and unpublished findings are to be regarded as privileged communications, and no persons should publish information thus first obtained unless properly authorized to do so.
5. The general rule covering cooperative activities is that the greatest possible courtesy should be observed by all persons at all times. In general it is not proper for a collector to request a systematist to determine whether an unstudied specimen is new or not and then, if determined as new, to claim the right of description for publication; but where it is desirable that material be compared with certain type specimens, the right of description may be retained by the collector, preferably by definite agreement with the person making the requested comparison with type material.
6. As recommended by the International Zoological Congress, persons noting that homonyms of existing species or genera have been published by a writer, should refer the matter to the author, notifying him of the homonym. It is here considered the duty of the author of the homonym to propose a substitute name immediately and to publish it promptly, at the latest within a year from the receipt of such notification. After one year, or at the suggestion of the author that someone else propose a new name, it is here considered proper for anyone to propose a new name.
7. The transfer of a species from one genus to another, one family to another, etc., is properly within the province of any writer without referring the matter to the author of the names involved; such transfer is a matter of individual opinion and the acceptance or non-acceptance of the combinations arrived at is a matter of consensus of opinion among zoologists.

8. In general, authors should avoid in their publications anything which shall seem to claim as original, ideas, discoveries or illustrations which are not original with them. For many generally or long known facts it is often obviously unnecessary or impossible to cite authority; it is, however, possible to avoid writing in a manner which seems to claim credit for subject matter or wording for which the credit belongs to another.

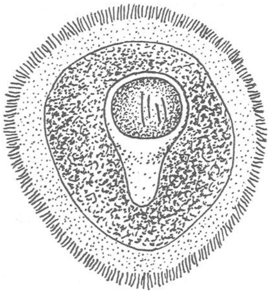
9. An official or superior should not take advantage of his position in connection with any publication resulting from work performed by his students or assistants, even when they are working under his immediate direction. Conversely, students, assistants and others should respect their obligations to their official superiors and colleagues.

10. When called into professional consultation by a practicing physician, an active member of this society should govern himself by the Principles of Medical Ethics adopted and published by the American Medical Association.

11. When called into professional consultation by a practicing veterinarian, an active member of this society should govern himself by the Code of Ethics adopted and published by the American Veterinary Medical Association.

12. In case of war, epidemic, or epizootic, in which technical zoological knowledge is of practical importance to the public authorities, zoologists should consider themselves at the service of such authorities, whether federal, state, or local.

13. A zoologist should acknowledge the right of an editor to edit copy in harmony with the established editorial rules of his journal, in so far as language and typography are concerned. In matters of fact and nomenclature, namely Latin systematic names, the author is considered to have the right of final decision.



Text Fig. A

The undersigned active members of the Helminthological Society of Washington, recognizing that a formal professional Code of Ethics will have a tendency to harmonize views occasionally at variance, agree to adopt the foregoing principles. [Signed by all active members.]

The recording secretary presented the following notes by Dr. Hadwen:

The Egg of Schizotaenia americana *(Stiles) a Porcupine Tapeworm*

In examining the eggs of tapeworms collected from *Erethizon epixanthus* in Alaska it was noticed that the outside shell of the egg was covered with minute spines, irregularly scattered over its entire surface. While a complete study of the tapeworm has not been made it seems identical with *Schizotaenia americana*. Material from *Erethizon dorsatus* in the collection of the zoological division of the Bureau of Animal Industry was also examined and the egg found to be exactly similar. Douthitt (1915) gives the measurements of the ova as 12 to 15μ in diameter. He also states that there is no pyriform apparatus attached to the pyriform body and this fact has been confirmed in the examination of the Alaskan material (Text Fig. A; see above).

Nematodirus tarandi, *a New Species of Nematode from the Reindeer*

Specific Diagnosis.—Nematodirus: Male averages 12 mm. in length by 75µ in width. The smallest specimen measured was 11.5 mm. long and the largest 13 mm. long. Spicules 2.72 mm. long and provided with shoe-shaped terminal piece. Esophagus about 300µ long. *Female* averages 16 mm. in length by 175µ in width. The smallest specimen measured was 13 mm. long and the largest 19 mm. long. The vulva is slightly anterior to a point two-thirds of the body length from the head end. The anus is about 80µ from the tail end. Eggs 75 to 100µ long by 50 to 75µ wide.

Host.—Reindeer, *Rangifer tarandus.*

Location.—Small intestine.

Distribution.—Alaska.

Type Specimens.—United States National Museum Collections No. 24611 (type and allotype) and No. 24960 (paratypes). Collected from reindeer at Egavik, Alaska, August 28, 1920, by Seymour Hadwen.

The recording secretary presented the following notes by Dr. Wm. A. Riley:

Dirofilaria immitis *in the Heart of a Cat*

I recently received from Dr. D. W. Davis, of the College of William and Mary, at Williamsburg, Va., two specimens of round worms from the heart of a cat. One of the specimens was incomplete. The other measured about 20 cm. in length and when found extended from the right auricle for about 3.5 cm. up into the precava. The other specimen was in the right ventricle, greatly distending that cavity. The worms proved to be *Dirofilaria immitis,* both being females. As far as I have noted, this well known parasite of dogs has not been reported for the cat. Horst (1889a) reports it from the right ventricle of the heart of the jaguar, *Felis onca,* and Kitt (1915) found specimens in the heart of the Sumatran tiger, *Felis sondiacus.* In this connection I might mention that I have seen two unreported cases in dogs in New York and that Dr. Johns of Tulane informed me that "half the dogs of New Orleans were infested." While this statement may not have been intended literally, it is at least evident that *Dirofilaria immitis* is not as rare in this country as has been supposed.

Additional Cases of Hymenolepis diminuta *in Man.* (Published in this JOURNAL, March, 1922.)

Dr. Ransom, in comment, discussed the relative frequency of *Taenia saginata, H. nana* and *H. diminuta* in the United States, noting that *T. solium* was very rare. *Cysticercus cellulosae* is correspondingly rare in swine in this country. In an examination of one million swine during the course of about one week, only 28 cases of infestation with this parasite were found. In some sections of the country, where there are a large number of Mexicans in the population, such as the region about Fort Worth, Texas, a larger number of cases are found and swine from these regions are given especial attention in meat inspection. Infestation is usually gross, to an extent not true for *Cyst. bovis,* and can be detected readily on routine inspection. This heavier infestation is due to the fact that the segments of *T. solium* commonly pass in chains whereas those of *T. saginata* pass as single segments, and to the fact that swine are commonly coprophagus, whereas cattle, as a rule, are not. He also noted the increasingly large number of cases of *Diphyllobothrium latum* originating in this country.

Dr. Cort commented on the large number of cases of *H. nana* in the South, some localities showing 1 to 7 percent infestations. Dr. Shillinger reported that in one year's experience in meat inspection he had only found 1 case of infestation with *Cyst. cellulosae,* this case showing a very heavy infestation. Dr. Ransom discussed the intermediate hosts and life history of *H. diminuta* and noted that its removal was apparently not difficult. He also noted that the rat and human forms of *H. nana* should be regarded as identical or at least as forms belonging to the same species and with only biological differences in the way of host adaptation.

Miss Cram presented the following notes:

New Records of Horse Strongyles from the United States

The following horse strongyles not heretofore reported from the United States have been found post mortem at Bethesda, Md.:

Oesophagodontus robustus, Cylicostomum goldi, C. auriculatum and *C. euproctus.* The following species, also from horses at Bethesda, Md. have been reported in England by Yorke and Macfie from horses which were purchased in the United States, but apparently have not been heretofore reported in this country:

Triodontophorus tenuicollis, T. brevicauda, Gyalocephalus equi, Cylicostomum coronatum, C. pseudo-catinatum, C. nassatum var. *parvum, C. longibursatum* and *C. minutum.*

Crassisoma urosubulatum *in the United States*

Worms from the small intestine of a pig which were sent in March, 1922, by Dr. Raffensperger from Chicago, proved to be *Crassisoma urosubulatum.* This is the third infestation with this parasite known in this country; Dr. Ransom reported it first at the November, 1920, meeting, noting two cases. Dr. Raffensperger writes that he found the worms present in large numbers in two pigs from Alabama. This species may therefore prove to be more common than has been supposed.

Dr. Cort presented a note on the escape of cercariae from snail hosts (see this JOURNAL, 8:177, June, 1922).

In comment, Dr. Ransom noted that schistosome cercariae live but a short time after their escape from their snail hosts and that Leiper has suggested the storage of water for a short time to allow such cercariae to die; they apparently live only 24 to 48 hours.

MAURICE C. HALL, *Recording Secretary.*